Table B-3: Arnot & Gobas Equations			
Biological			
Component	**Symbol**	**Units**	**Equation**
Chemical concentration in the organism	C_B	pg/kg WW	$C_B = \{k_1*(m_O*C_{WD}+m_P*C_{WD.P}) + k_D * \Sigma Pi*C_{D,i}\}/(k_2+k_E+k_c+k_M)$ **Equation 1**
Chemical concentration in prey item *i*	$C_{D,i}$	pg/kg ww	same as above; included to indicate that the general equation is also used to estimate chemical concentrations in prey species **Equation 1**
Organism-water partition coefficient on a wet weight basis	K_{BW}	unitless	$K_{BW}=k_1/k_{2=}v_{LB}*K_{OW}+V_{NP}*\beta*K_{OW}+v_{WP}$ **Equation 2**
Rate constant for aqueous uptake (fish, invertebrates and zooplankton)	k_1	L/kg/day	$k_1 = E_w*G_v/W_B$ **Equation 4**
Gill ventilation rate	G_V	L/d	$G_V= 1400*W_B^{0.65}/C_{OX}$ **Equation 5**
Respiratory surface chemical uptake efficiency	E_w	unitless	$E_w= (1.85 + (155/K_{ow}))^{-1}$ **Equation 7**
Rate constant for aqueous uptake (algae, phytoplankton and aquatic macrophytes)	k_1	L/kg/day	$k_1 = (A+(B/K_{ow}))^{-1}$ **Equation 8**
Rate constant for chemical elimination via the respiratory area (gill)	k_2	day^{-1}	$k_2 = k1/K_{BW}$ **Equation 9**
Phytoplankton-water partition coefficient on a wet weight basis	K_{PW}	unitless	$K_{PW} = v_{LP}*K_{OW} + v_{NP}*0.35*K_{OW} + v_{WP}$ **Equation 10**
Rate constant for chemical uptake via ingestion and digestion of food and water	k_D	kg food/kg organism/day	$k_D = E_D*G_D/W_B$ **Equation 11**
Dietary chemical transfer efficiency	E_D	unitless	$E_D= (3.0*10^{-7}*K_{OW}+2.0)^{-1}$ **Equation 12**
Feeding rate - other species	G_D	kg/d	$G_D = 0.022*W_B^{0.85}*e^{(006*T)}$ **Equation 13**
Feeding rate - filter-feeders	G_D	kg/d	$G_D=G_V*C_s*\sigma$ **Equation 14**

Table B-3: Arnot & Gobas Equations			
Component	**Symbol**	**Units**	**Equation**
Rate constant for chemical elimination via excretion into egested feces	k_E	day^{-1}	$k_E = G_F*E_D*K_{GB}/W_B$ **Equation 15**
Partition coefficient of the chemical between the contents of the gastrointestinal tract and the organism	K_{GB}	unitless	$K_{GB} = (v_{LG}*K_{OW}+v_{NG}*\beta*K_{OW}+v_{WG})/(v_{LB}*K_{0W}+v_{NB}*\beta*K_{OW}+v_{WB})$ **Equation 16**
Fecal egestion rate	G_F	kg/d	$G_F=\{ (1-\delta_L)*V_{LD})+(1-\varepsilon_L)*V_{ND}+(1-\varepsilon_N)*V_{WD}\}*G_D$ **Equation 17**
Lipid fraction of gut contents	v_{LG}	kg lipid/kg digesta ww	$v_{LG} =(1-\varepsilon_L)*v_{LD}/[(1-\varepsilon_L)*v_{LD}+(1-\varepsilon_N)*v_{ND} +(1-\varepsilon_W)*v_{WD}]$ **Equation 18**
NLOM fraction of gut contents	v_{NG}	kg NLOM/kg digesta ww	$v_{NG} =(1-\varepsilon_L)*v_{ND}/[(1-\varepsilon_L)*v_{LD}+(1-\varepsilon_N)*v_{ND} +(1-\varepsilon_W)*v_{WD}]$ **Equation 19**
Water fraction of gut contents	v_{WG}	kg water/kg digesta ww	$v_{WG} =(1-\varepsilon_L)*v_{WD}/[(1-\varepsilon_L)*v_{LD}+(1-\varepsilon_N)*v_{ND} +(1-\varepsilon_W)*v_{WD}]$ **Equation 20**
Rate constant for growth of aquatic organisms	k_G	day^{-1}	$K_G= 0.0005 \times W_B^{-0.2}$ **Equation 21**
Rate constant for metabolic transformation of chemical	k_M	day^{-1}	Metabolism of PCB and DDE are not expected to be significant for application of the model to Portland Harbor. Estimates for k_M were, however, identified in the model calibration process
Overall lipid content of the diet	v_{LD}	kg lipid/kg food ww	$v_{LD} = \Sigma P_i*v_{LB,i}$ **Total dietary lipid**
Overall NLOM content of the diet	v_{ND}	kg NLOM/kg food ww	$v_{ND} = \Sigma P_i*v_{NB,i}$ **Total dietary non-lipid organic matter**
Overall water content of the diet	v_{WD}	kg water/kg food ww	$v_{WD} = \Sigma P_i*v_{WB,i}$ **Total dietary water**
Chemical			
Component	**Symbol**	**Units**	**Equation**
Bioavailable Solute Fraction	ϕ	unitless	$\phi=1/(1+\chi_{POC}*D_{POC}*\alpha_{POC}*K_{OW}+\chi_{DOC}*D_{DOC}*\alpha_{DOC}*K_{OW})$ **Equation 3**
Dissolved oxygen concentration of water (RM 2 to RM 11)	C_{OX}	mg 0_2/L	$C_{OX} = (-0.24*T+14.04)*0.9$ **Equation 6**

Table B-3: Arnot & Gobas Equations			
Component	**Symbol**	**Units**	**Equation**
Freely dissolved chemical concentration in the pore water	$C_{WD,P}$	ng/L	$C_{WD,P} = C_{S,OC} * \delta_{OCS} / K_{OC}$ **Equation 22**
Chemical concentration in the sediment, organic carbon normalized	$C_{S,OC}$	pg/kg dw OC	$C_{S,OC} = C_S / OC_{Sed}$ **Equation 23**
Freely dissolved chemical concentration in the water (total PCBs as congeners and 4,4'-DDE)	C_{WD}	ng/L	$C_{WD} = C_{WT} * \phi$ (See Equation 1)
Organic carbon-water partition coefficient (total PCBs as Aroclors and 4,4'-DDE)	Log Kqc	unitless	$\text{Log } K_{OC} = \text{Log}_{10}(0.35 * 10^{\text{Log Kow}})$